REMARKS

The Rejections Under §112 and Claim Objections

Claim 9 has been rewritten to correct a typographical error. Claim 17 has been rewritten for purpose of better clarity and not for any reason related to patentability. The scope of the claim remains unchanged.

The Rejections Under 35 U.S.C. §103

Claims 1-3, 5-8, 10 and 15-20 stand rejected under 35 U.S.C. §103 as being unpatentable over WO 96/17903. Applicants respectfully traverse for the reasons given below. The amendment to claim 1 above further defines an element of the processes of claims 1-20, which is the residual sulfur content of the kerosene and/or a gas oil cut. The processes now defined by claims 1-20 with respect to the results achieved are so far removed from methods disclosed in the prior art that they are unobvious. The remaining defined elements of the processes are unchanged.

WO 96/17903 discloses a hydrodesulfurization process for effecting a hydrocarbon feedstock comprising supplying the feedstock to distinct hydrotreatment zones. First and second hydrotreatment zones each contain a charge of a sulphided hydrotreatment catalyst. The first hydrotreatment zone causes hydrodesulfurization of the feedstock which includes aromatics and organic sulfurous impurities.

WO '903 discloses several examples with two stage hydrotreatment which demonstrate the amount of residual sulfur obtained with the hydrodesulfurization process. A review of the two stage hydrotreatment examples would reveal that two major plant configurations were used as relates to the placement of the catalyst charge between the two hydrotreatment zones. Either a 25:75 volume ratio or a 50:50 volume ratio was utilized (page 39, third paragraph). Careful review of the hydrotreatment conversion ratios obtained using the different volume ratios would reveal that a 50:50 volume ratio actually yielded the lower amount or residual sulfur in the oil in line 166. Compare for example the residual sulfur in the oil in Examples 6, 7, and 8. In Example 6 wherein the diesel feedstock is supplied as in Figure 2 (using a 25:75 volume ratio), the amount of residual sulfur in the oil is 99 ppm. In Example 8, using a 25:75 volume ratio, the amount of residual sulfur in the oil is 111 ppm. By contrast, in Example 7, using a 50:50 volume ratio wherein the feedstock is supplied as in Figure 3, the amount of residual sulfur in the oil is 75 ppm. Similarly, a comparison

of residual sulfur levels obtained in Examples 15-17 would reveal that a 50:50 volume ratio yielded the lowest residual sulfur in the oil. Examples 15 and 17 utilized a 25:75 volume ratio which yielded residual sulfur levels of 68 ppm and 113 ppm, respectively. Example 16 which utilized a 50:50 volume ratio yielded a residual sulfur level of 62 ppm. This data clearly demonstrates that the optimal distribution of catalyst between the two zones is about 50% catalyst in each of zones 1 and 2.

Applicant's invention is directed to a process for hydrodesulphurising a kerosene and/or a gas oil cut to a residual sulfur content of less than 30 ppm weight, as now recited in claim 1. Further, the quantity of catalyst used in the first step of the process is about 5 to 40% by weight of the total quantity of catalyst used in the process. Clearly, there is a significant and notable difference between the process as disclosed in WO 96/17903 and Applicant's process as observed in the amounts of sulfur content in the final gas oil product. The lowest amount of sulfur obtained in the oil of the WO '903 process was about 60 ppm, while the amount of sulfur in the final gas oil product of the instant invention was on the order of 10-30 ppm (see Examples 4 and 5 of the instant invention). Moreover, the arrangement of catalyst which yielded the lowest amount of sulfur in the final product of the WO '903 disclosure was a 50:50 volume ratio distribution as described above. By contrast, Applicant's invention utilizes a quantity of catalyst that is about 5 to 40% by weight in the first step of the quantity of catalyst used in the process.

Clearly, one of ordinary skill in the art reading the WO 96/17903 disclosure would not have been motivated to select a distribution of catalyst quantities as recited in claim 1 of the instant invention with the goal of obtaining the lowest amount of residual sulfur in the final gas oil product. In fact, the '903 disclosure would actually teach away from Applicant's claimed process. Examination of the data gathered in the different Examples disclosed in WO '903 would suggest that a 50/50 distribution of catalysts between the two hydrotreatment zones would in fact yield the optimal distribution. Applicant's invention clearly provides an unexpected advantage as seen from Examples 3-5.

Where there is no adequate teaching or suggestion or motivation in a prior art reference to modify the process to arrive at the claimed process, there can be no proper legal basis for obviousness, *In re Laskowski et al* (CAFC 1989) 871 F.3d 115, 10 PQ2d 1397. Further, the teachings of the '903 disclosure would actually teach away from the present invention, therefore, there is a clear legal basis for withdrawal of the rejection of the claims under §103.

Claim 4 is rejected under §103 as being obvious over WO 96/17903 as applied to claim 1, further in view of Pruiss ('557). Applicants traverse this rejection on the basis of the arguments recited above as relates to claim 1. Pruiss does not cure the defect in the WO 96/17903 reference. Any combination of flashing as disclosed by Pruiss would clearly not lead to applicant's claimed invention. Therefore, any rejection of claim 4 which depends from claim 1 is improper and should be withdrawn.

Claims 9 and 11-14 stand rejected under §103 as being obvious over WO 96/17903 in view of Bridge. Bridge discloses hydrogenating catalysts which contain a halogen and phosphorous. This does not cure the defect in the WO reference as discussed above. Claims 9 and 11-14 depend from claim 1 and any combination of halogen and phosphorous with the process of the WO reference clearly would not lead to applicant's claimed invention. Any rejection of these claims is clearly improper and should be withdrawn.

In view of the above remarks, favorable consideration is courteously requested. However, if there is any remaining issues which can be expeditiously resolved by a telephone conference, the Examiner is courteously requested to telephone the undersigned at the number indicated below.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Version With Markings to Show Changes Made".

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

Please amend the claims as follows:

1. (Twice Amended) A process for hydrodesulphurising a kerosene and/or a gas oil cut to a residual sulfur content of less than 30 ppm weight comprising:

at least one first hydrodesulfurization step a) in which said kerosene and/or gas oil cut and hydrogen are passed over a catalyst disposed in a fixed bed comprising on a mineral support, at least one metal or compound of a metal from group VIB of the periodic table in a quantity, expressed as the weight of the metal with respect to the weight of the finished catalyst, of about 0.5% to 40%, at least one non noble metal or compound of a non noble metal from group VIII of said periodic table in a quantity, expressed as the weight of the metal with respect to the weight of the finished catalyst, of about 0.1% to 30%, and

b) at least one subsequent second step b) in which a gas fraction containing a portion of the resultant hydrogen sulphide contained in the total effluent from said first hydrodesulfurization step a) and an effluent that is partially depleted in hydrogen sulphide are recovered,

c) at least one third step c) in which at least a portion of the hydrogen sulphide-partially depleted effluent from step b) and hydrogen are passed over a catalyst disposed in a fixed bed comprising, on a mineral support, at least one metal or compound of a metal from group VIB of the periodic table in a quantity, expressed as the weight of the metal with respect to the weight of the finished catalyst, of about 0.5% to 40%, at least one non noble metal or compound of a non noble metal from group VIII of said periodic table, in a quantity, expressed as the weight of the metal with respect to the weight of the finished catalyst, of about 0.1% to 30%, wherein the quantity of catalyst used in the first step is about 5% to about 40% by weight of the total quantity of catalyst used in said process.

9. (Twice Amended) The process according to claim 1, wherein ~~th~~ the catalyst used in step a) and that used in step c) each further comprise at least one element selected from the group consisting of silicon, phosphorous and boron or one or more compounds of said elements.

17. (Amended) The process according to claim 1, wherein the catalyst support of steps a) or c) is selected from the group consisting of: alumina, silica, silica-alumina, zeolite, magnesia, titanium oxide, and mixtures thereof.